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CHEMICAL & ENGINEERING
NEWS

1991 Pittsburgh Conference program Page 67

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Conductive Polymers

Research brings intriguing products closer to market
Page 36

CHEMICAL & ENGINEERING NEWS

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DECEMBER 3, 1990

News of the Week

■ **Scientists' panel assails Institute of Medicine report that recommends shifting scarce research grant funds to training and facilities.** **Page 6**

■ **Researchers determine atomic structure of cell-surface glycoprotein that plays vital role in human HIV infection.** **Page 7**

■ **New formaldehyde-from-methane direct oxidation method uses mild conditions and has oxygen conversion of 10% or less.** **Page 7**

■ **OSHA begins hearings on major regulatory proposal regarding chemical process safety.** **Page 8**

■ **U.S.-based SPI Pharmaceuticals and Yugoslavia's Galenika Pharmaceuticals announce merger, will be first such East-West union.** **Page 8**

Cover: Graduate student at Michigan State University tests conductive polymer

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Business

Drugs that treat disease by inactivating genetic process to prevent synthesis of disease-causing proteins are aim of young research firms. **Page 17**

Government

Massive budget bill holds grab bag of surprises, including extension of Superfund, provisions on pension plans. **Page 23**

Science/Technology

Advances in polarimetric detectors and microdialysis were among the highlights for the more than 3600 attendees at the 29th Eastern Analytical Symposium. **Page 29**

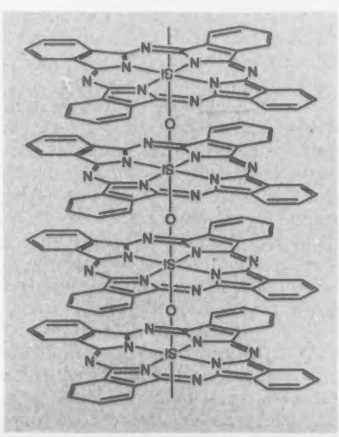
New lamp coating that blocks infrared light and reduces energy needed to keep filament hot enough to produce light is developed by General Electric researchers. **Page 35**

Books

Advice to scientists on the ins and outs, pros and cons of "Effective Expert Witnessing"; autobiographies of eminent organic chemists are also reviewed. **Page 55**

Meetings

1991 Pittsburgh Conference miniprogram includes listing of technical sessions, registration, other information. **Page 67**



Special Report

Excitement about practical uses for conductive polymers is high and some exotic products are closer to market, as research in the field continues to make steady progress. **Page 36**

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LETTERS

Catalytic antibodies

One of your articles (C&EN, May 28, page 26) described a tailor-made molecule: a catalytic antibody. Indeed, during the past decade, several articles describing the enzymatic activity discovered in various immunoglobulins, as well as synthetic proteins, have appeared in the literature. Having predicted this in 1974, I can only express my satisfaction with this development. The following describes how and why we had undertaken the studies that led to a most unexpected finding.

Increasing examples of engineered molecules comprised of immunoglobulin and of proteolytic enzyme halves, as well as of immunoglobulin molecules having proteolytic activity are quite interesting, but not surprising. In the early 1970s, during a study of homologies found among ancestrally unrelated proteins, we observed striking homologies between serine containing active site fragments of bovine trypsin as well as bovine chymotrypsin, the *S. Griseus* enzyme, and different Bence-Jones proteins, which we published in *Nature* [**251**, 353 (1974)]. We asked the question "Do immunoglobulins have proteolytic activity?" It is gratifying to see that these predictions are finally bearing fruit.

It makes eminent sense to have degradative activity(-ies) in immunoglobulin molecules, because this would increase their effectiveness. Natural selection can be expected to favor organisms that have these kinds of variants of immunoglobulins. Particularly when one considers an enzyme active site as a three-dimensional space, where certain functional groups are situated in a strategic way, one can easily accept that such activities could be manifest in many parts of proteins, or even nucleic acids.

Two ideas prompted the homology studies that led to the unexpected homologies discovered in 1974 and that have a bearing on this issue.

One, when small molecules such as RNase possess enzymatic activity, it is hard to believe that larger molecules could have only one activity or active site. In other words, if one were to search for biological activities in large molecules other than the ones for which they are known, one is likely to find some of them on these seemingly unlikely places. In endorphins, enkephalins, peptides A and B of cofibrin, and quite a few other cases, one finds examples of this idea. Whether they perform their biological functions while being a part of the larger molecule, or after being cleaved selectively by appropriate enzymes, is not important.

Two, it is pretty well established that all living organisms have stemmed from the first successful primordial cell. This ancestral cell, however, was obviously much simpler than the present-day organisms; namely, it had far fewer and smaller genes. During evolution, through gene duplications and mutations, etc., the number and complexity of these genes, and consequently of cellular proteins, have increased. However, we strongly believe that it should be possible to detect these original "segments" by studying the homologies among not only ancestrally related, but also unrelated, proteins. Fortunately for us, this expectation bore fruit.

Semih Erhan
Director of Research
Department of Dental Medicine
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Career dedication

I felt a lot of sympathy for Ralph B. Nielsen's letter on graduate education. (C&EN, Sept. 10, page 3).

However, like so many others, he misses a point. This is, that the modern world is very highly competitive, and to get to the top in anything requires full-time dedication, which means giving up many things. Time off for any reason is likely to be fatal to really high career prospects.

Many women feel that other things are too important to be sacrificed for career prospects, and are consequently not willing to give the full-time dedication that is necessary for the highest success at anything. This I would claim is a major reason why women do not so often reach the highest positions. Moreover, in my experience I even think it is true that the most able women are more likely to think like this than some of the less able ones, which reduces the statistical chances of female success even more.

In my opinion, the women who will not give up other things for success in a career are absolutely right. What a terrible thing it would be if women were as deeply involved in the rat race as so many men are. What a lot of strain illness would be saved if more men thought that way too.

D. A. H. Taylor
Scarborough, Yorks, U.K.

BIOMEDICAL RESEARCH: Call for shifts in funding attacked

A panel of scientists representing the Federation of American Societies for Experimental Biology has rejected an Institute of Medicine report's recommendation to shift scarce National Institute of Health funds from research grants into training and facilities. The report's basic premise that research grants are receiving an inordinate share of funding at the expense of training is wrong, the FASEB group claims.

"If IOM's recommendations were carried out," says FASEB president Thomas S. Edgington, "they would have a strongly negative impact not only on the conduct of research but also on recruitment of new scientific investigators and would decrease the benefits of research to the public." But a member of the IOM committee that wrote the report says the FASEB group has misinterpreted it.

IOM's recommendations are relevant to chemical research: Almost one third of research funding for academic chemistry comes from NIH.

"We advocate ... a total increase of support of the enterprise as a whole," Edgington says. The IOM committee also would have liked to ask for more research funding, but its charge was how to best use available funds.

Edgington, professor of immunology at the Research Institute of Scripps Clinic, La Jolla, Calif., and six other scientists from the seven societies that make up FASEB met in late October to review the IOM report, "Funding Health Sciences Research: A Strategy to Restore Balance." The controversial report was presented in a symposium at the National Academy of Sciences in Washington, D.C., in September (C&EN, Oct. 8, page 22), but only was officially published in November.

IOM's panel on policies for allocating health sciences research funds spent two years putting its report together. The charge to the committee was to analyze the balance of funding for research projects, training, facilities, and equipment and suggest corrections if required. Under the ground rules set by IOM president Samuel O. Thier, the committee was not allowed to ask for more money for biomedical research.

The panel concluded that the share of available funds going to support training, construction, and equipment has been declining, with an increasing proportion going to research project grants—which bodes ill for the future. "We're eating our seed corn," committee chairman Floyd E. Bloom, head of the pharmacology department at Scripps Clinic, said at the September symposium.

"We must do something to begin to rectify what has occurred over the past 15 years," Bloom said. Therefore, the committee recommended shifting a small but significant portion of NIH's extramural funds from grant support into training and construction—even if NIH's budget does not increase over the next decade. "We did so even though we recognize there already is a growing problem in funding research," Bloom said.

The FASEB group contends the IOM report is based on a false premise and thus reaches incorrect conclusions. "We disagree with the basic premise of imbalance," Edgington says. "Training has not decreased."

According to the FASEB analysis, even though the proportion of funds earmarked for trainees has slipped, individual research grants have adopted much of the support for training. Edgington suggested the IOM panel may have overlooked that subtlety because the panel was made up mostly of research administrators and social scientists and had few "working scientists."

"That's preposterous," says Ronald C. Breslow, professor of chemistry at Columbia University and one of the working scientists on the IOM committee. "Of course we know trainees are supported by research grants. We're not chumps. We decided that was not the best way to do it."

The panel concluded that training grants and fellowships are better ways to educate researchers. "Supporting training through research grants ties training too much to the success of the research adviser," Breslow says. "Giving money to the student rather than the sponsor changes their relationship. Trainees can then work on their own projects rather than being a sort of employee. It's more encouraging to the student to be told 'You are a winner' rather than 'Just go beg for support.'"

Pamela Zurer

Grants would suffer if number of trainees increased

$ Millions	1990	2000	Difference
IOM recommendation[a]			
Research project grant support	$ 3,822	$ 3,640	−$182
Training support	$ 267	$ 379	+$112
FASEB impact analysis[b]			
Number of project grants[c]	20,463	19,487	−976
Number of trainees[d]	11,128	15,803	+4675

a Institute of Medicine proposal assuming no real growth in National Institutes of Health budget. b Analysis of IOM proposal carried out by panel of scientists from Federation of American Societies for Experimental Biology. c Assumes research project grants average $186,800. d Assumes costs of trainees average $24,000. **Sources:** IOM, FASEB